Remarks

Please cancel claim 6, whose limitations are very similar to those of claim 5.

Claims 1-20 have been finally rejected under 35 U.S.C. §103(a) as being unpatentable over Hartley et al., U.S. Patent No. 4,853,737 ("Hartley) and, incorporated by reference, Lentz, U.S. Patent No. 4,257,699 ("Lentz") in view of Schlueter, Jr. et al., U.S. Patent No. 5,995,796 ("Schlueter"), Kirk-Othmer, "Elastomers, Polyisoprene to Expert Systems," *Encyclopedia of Chemical Technology*, pp. 16-20, 22-25 (4th Ed., Vol. 9, John Wiley & Sons, 1994) ("Kirk"), and Lewis, *Hawley's Condensed Chemical Dictionary*, pp. 437, 1097 (13th Ed., Van Nostrand Reinhold Publ., 1997) ("Lewis"). Also, claims 1-22 have been finally rejected under 35 U.S.C. §103(a) as being unpatentable over Hartley in view of Schlueter, Blong et al., U.S. Patent No. 5,527,858. ("Blong"), Kirk, and Lewis. These rejections are respectfully traversed.

Hartley, the primary reference cited in the rejection of the claims of the instant application, discloses a fuser roll having an outer layer that comprises cured fluorooelastomer having pendant polydiorganosiloxane segments that are covalently bonded to the fluoroelastomer backbone. DuPont Viton A and Viton B are cited as suitable fluoroelastomer base polymers. Lentz and Schlueter, like Hartley, disclose compositions containing cured fluoroelastomers such as Viton A and Viton B.

In maintaining the §103(a) rejection of the claims in ¶¶4-5 of the Office Action, the Examiner twice asserted that "Although 'fluoroelastomer' Viton B of Hartley et al is substantially identical in structure and composition (emphasis added) to that of claimed fluorocarbon thermoplastic random copolymer, Hartley et al do not expressly state that 'fluoroelastomer' is thermoplastic." Hartley (as well as Lentz and Schlueter) do not state that a cured fluoroelastomer is thermoplastic because it is, in fact, not thermoplastic. Fluoroelastomers and fluorocarbon thermoplastic random copolymers are well recognized in the art and in commercialized polymer technology as distinct classes of materials having substantially differing characteristics, even if formed from the same monomers in amounts contained within the same specified ranges. In other words, cured fluoroelastomers and fluoroplastics differ substantially in structure and physical characteristics, even though they may be of similar chemical composition. The differentiation of cured or cross-linked fluoroelastomers from fluoroplastic polymers will be further emphasized in the discussion that follows.

As disclosed in Encyclopedia of Chemical Technology, Fourth Edition, 1993, Volume 8, page 990, a copy of which was included as Attachment A to the applicants' previously filed Appeal Brief, "Fluorocarbon elastomers are synthetic, noncrystalline polymers that exhibit elastomeric properties when cross-linked....In the 1960s, terpolymers of vinylidene fluoride, hexafluoropropylene, and tetrafluoroethylene, CF2=CF2, were developed and were commercialized by DuPont as Viton B." (emphasis added)

Also, as described in Hull et al., "THV Fluoroplastic" in *Modern Fluoropolymers*, 1997, Chapter 13, pages 257-259, a copy of which was included as Attachment C to the applicants' previously filed Appeal Brief, a melt-processable fluoroplastic, developed by Hoechst AG and marketed as Dyneon™ THV fluorothermoplastic, consists of tetrafluoroethylene (TFE), hexafluoropropylene (HFP), and vinylidene fluoride, and is typically processed by melt extrusion at temperatures in the range of 230-250°C. As previously noted, THV fluorothermoplastic is formed from the same three monomers as the fluoroelastomer Viton B.

Schifman, U.S. Patent No. 6,203,873 ("Schifman") discloses a blend of at least a first fluorinterpolymer characterized as a fluoroelastomer, and a second fluorointerpolymer characterized as a fluoroplastic, and also discloses that the first fluorinterpolymer having elastomeric characteristics and the second fluorointerpolymer having thermoplastic characteristics each comprises a copolymer, terpolymer, or mixture thereof formed by the copolymerization of two or more monomers selected from the group consisting of HFP, VF, and TFE. Schifman further discloses that the blend used to form barrier layer 10 contains a fluoroelastomer that can be a vinylidene fluoride-hexafluoropropylene-tetrafluoroethylene terpolymer such as a Fluorel® material, and a fluoroplastic that can be a tetrafluoroethylene-hexafluoropropylene-vinylidene fluoride terpolymer such as Dyneon THV. Thus, Schifman teaches that both the elastomeric and the thermoplastic fluorointerpolymers can be formed from the same group of three monomers that also constitute the fluorocarbon thermoplastic random copolymer included in the coating composition of the present invention.

The disclosure of Effenberger et al., U.S. Patent No. 5,194,335, which was discussed in the applicants' previously filed Request for Reconsideration, provides

further convincing evidence that fluoroelastomers and fluoroplastics are recognized as distinctly different classes of materials by those skilled in the art.

In ¶¶4-5 of the Office Action, the Examiner also twice asserted that "It is well known in the art that elastomers, including fluoroelastomers, include both thermosetting and thermoplastic polymers. See Lewis and Kirk in entirety, especially page 25 of Kirk." The applicants respectfully disagree with this assertion, which finds no support in the teachings of Lewis and Kirk.

As discussed by the applicants in their previous Request for Reconsideration, Lewis includes definitions of "elastomer," "thermoplastic," and "thermoset" that can be summarized as follows:

An "elastomer" originally referred to "synthetic thermosetting high polymers having properties similar to those of vulcanized natural rubber..." (emphasis added) when cross-linked. Lewis further states that the " term was later extended to include uncross-linked polyolefins that are thermoplastic, ...whose extension and retraction properties are notably different from those of thermosetting elastomers..." (emphasis added)

Thus, Lewis teaches that an "elastomer" thermoset by curing or cross-linking (as in the cured Viton elastomers employed in Hartley, Lentz, Schlueter, and Eddy et al., U.S. Patent No. 5,017,432) is a rubbery material.

The term "thermoplastic" refers to a "high polymer that softens when exposed to heat and returns to its original condition when returned to room temperature." Thermoplastic polymers include both natural substances such as crude rubber and synthetic materials such as fluorocarbon polymers.

The term "thermoset " refers to a polymer that "solidifies or 'sets' irreversibly when heated," a property "usually associated with a cross-linking reaction of the molecular constituents induced by heat or radiation..." (emphasis added) The cross-linking reaction can be promoted by the addition of curing agents such as organic peroxides or (in the case of rubber) sulfur. Thermoset materials thus include cross-linked synthetic polymers or additive-induced cross-linked natural materials such as vulcanized rubber.

Based on the definitions provided by Lewis, the term "thermoset" applies both to cross-linked fluoroelastomers such as cured Viton A or Viton B and to cross-linked thermoplastic fluoropolymers such as cured THV fluorothermoplastics. The applicants acknowledge that cured elastomers are thermosets; however cross-linked

thermoplastic fluoropolymers such as cured THV fluorothermoplastics are not fluoroelastomers.

Kirk relates to synthetic thermoplastic elastomers, which, as discussed on page 16, are typically multiphase systems containing thermodynamically incompatible mixtures of a hard polymer that becomes fluid on heating and a softer material that is rubberlike at room temperature. These two types of materials tend to separate into two phases, even when they are chemically combined into the same molecule by block or graft copolymerization. On page 18, Kirk states that "Not all thermoplastic elastomers are block copolymers. Those that are not are usually combinations of a hard thermoplastic with a softer, more rubberlike polymer. Usually, the components are mechanically mixed together, although it is sometimes possible to produce the rubber component *in situ* during polymerization." (emphasis added)

The applicants' fuser member is formed by coating a composition comprising a fluorocarbon thermoplastic random copolymer such as THV fluorothermoplastic and a curing agent on a support and curing the coated layer for 5 to 10 hours at a temperature in the range of 25°C to 120°C. In ¶6 (A) of the Office Action, the Examiner stated that Lewis applies the term "thermoplastic" to uncrosslinked rubbers. The applicants respectfully disagree; the "thermoplastic" entry in Lewis contains no reference to cross-linking, or the absence thereof.

The Examiner further stated in ¶6 (A) that Lewis applies the term "thermoset" to crosslinked fluoroelastomers such as *cured* Viton B, and that the cured Viton B fluoroelastomer disclosed in Hartley is not thermoplastic. The applicants agree that cured Viton B is thermoset and not thermoplastic; they also agree with the Examiner's statements that their claim 1 recites that "a coating composition comprises a fluorocarbon thermoplastic random copolymer *and* a curing agent **before** curing" and that "Viton B in Hartley et al is cured *after* being coated onto the support as required by claim 1." However they respectfully disagree with the Examiner's unsupported and incorrect assertion that the Viton B elastomer of Hartley is "embraced by the claimed fluorocarbon thermoplastic polymer because Viton B is uncured (non-crosslinked) elastomer having vinylidene fluoride, hexafluoropropylene and tetrafluoroethylene in proportions corresponding to those in the claimed fluorocarbon thermoplastic polymer." (emphasis added) Both the terpolymeric Viton B and Viton A, a copolymer of hexafluoropropylene-vinylidene fluoride that is used in all the illustrative examples of Hartley, are cured, i.e., cross-linked in the coated layer,

rendering them thermoset and elastomeric. By contrast, cured fluorocarbon thermoplastic polymers, although thermoset, are not fluoroelastomers.

In ¶6 (B) of the Office Action, the Examiner disagreed with the applicants' argument that the thermoplastic elastomer of Kirk is typically a multiphase block copolymer or a mechanically blended mixture, stating that it "is sometimes possible to produce the rubber component *in situ* during polymerization (i.e. forming a random copolymer)." In response, the applicants respectfully point out that thermoplastic elastomers, no matter what multistep procedure is used to form them, are multiphase polymeric systems that include distinct hard and soft phases and are thus dissimilar from the cured fluorocarbon thermoplastic random copolymer of the applicants' invention.

In the rejection of the claims, the Examiner cited the disclosures of "Lewis and Kirk in entirety, especially page 25 of Kirk." (emphasis) However there is no discussion in the Office Action of the teaching of particular relevance that is to be found on page 25 of Kirk.

Blong, cited in the §103(a) final rejection of claims 1-22, is directed to a melt-processable coating composition that comprises a blend of a major amount of a melt-processable thermoplastic fluoropolymer component and 0.01-20 wt.% of a poly(oxyalkylene) component. In the illustrative examples of Blong, 3M THV 500 Fluoroplastic is employed as the major thermoplastic fluoropolymer component, with Carbowax™ or Polyox™ polyethylene glycols being used as the poly(oxyalkylene) component. The disclosed blends are melt-processed by extrusion at temperatures of 180-280°C. Thus, the composition of Blong is an example of a multiphase hard polymer/elastomer combination, as described in Kirk and discussed above.

Hartley discloses curing a coated fluoroelastomer-containing layer at temperatures of at least 230°C; similarly, Lentz includes an example with a curing temperature of 232°C. Neither Hartley nor Lentz nor any of the other cited references teach the use of a metal oxide or combination of oxides to enable low temperature curing of a fluoropolymer layer. By contrast, the applicants' method of making a fuser advantageously provides for the low-temperature curing, at a temperature of 25°C to 120°C, preferably 25°C to 50°C, more preferably 25°C, of a layer formed from a fluorocarbon thermoplastic random copolymer composition containing antimony-doped tin oxide particles.

The applicants respectfully again call attention to the following eight recent patents, each of which issued from an application filed June 30, 2000 and, with one exception, was each allowed by a different primary examiner:

U.S. Patent Nos. 6,355,352; 6,361,829; 6,372,833; 6,416,819; 6,419,615; 6,429,249; 6,444,741; and 6,696,158.

As noted in the applicants' previous response, each of these eight patents discloses and claims a coating composition that comprises a fluorocarbon thermoplastic random copolymer containing the same ranges of the same monomers as that recited in claim 1 of the instant application, Serial No. 09/608,818, also filed June 30, 2000, i.e., subunits of —(CH_2 CF_2)x—, —($CF_2CF(CF_3)$y—, and —(CF_2 CF_2)z—, wherein x is from 1 to 50 or 60 to 80 mole percent, y is from 10 to 90 mole percent, z is from 10 to 90 mole percent, and x + y + z equals 100 mole percent. Also as previously noted, Hartley, the lead reference in the rejection of the instant application, is a cited reference in every one of these patents except U.S. Patent No. 6,419,615. It seems hardly possible that seven primary examiners are all guilty of serious errors in allowing the issuance of U.S. Patent Nos. 6,355,352; 6,361,829; 6,372,833; 6,416,819; 6,429,249; 6,444,741; and 6,696,158.

The Board's Decision, at the bottom of page 6, stated: "In the event of further prosecution of this application, the examiner is to determine whether Eddy alone or in combination with Blong affects the patentability of the claimed subject matter." (emphasis added) As already noted above, Blong is cited, in combination with Hartley, Schlueter, Kirk, and Lewis in the rejection of claims 1-22, but there is no indication of its having been considered in combination with Eddy. Also, the fact that Eddy is not mentioned at all in the Office Action strongly suggests that its teachings alone have not been considered in relation to the applicants' claimed invention. It appears that the Examiner has failed to comply with the aforementioned directive from the Board.

Because the combined teachings of the cited prior art references fail to render obvious the appellants' invention, withdrawal of the §103(a) final rejections of the claims is respectfully requested. Claims 1-5 and 7-22 are now in this case, whose prompt allowance is earnestly solicited.

Respectfully submitted,

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